

According to this approach, contraceptives are the best method for lowering the birth rate.

Bangladesh is an example of a country that has had little improvement in the wealth and literacy of its people, but 58 percent of the women in the country used contraceptives in 2006 compared to 6 percent a quarter-century earlier. Similar growth in the use of contraceptives has occurred in other LDCs, including Colombia, Morocco, and Thailand. Rapid growth in the acceptance of family planning is evidence that in the modern world, ideas can diffuse rapidly, even to places where people have limited access to education and modern communications.

The percentage of women using contraceptives is especially low in Africa, so the alternative of distributing contraceptives could have an especially strong impact there. About one-fourth of African women employ contraceptives, compared to three-fourths in Latin America and two-thirds in Asia (Figure 2-22). The reason for this is partly economics, religion, and education. Very high birth rates in Africa and southwestern Asia also

reflect the relatively low status of women. In societies where women receive less formal education and hold fewer legal rights than do men, women regard having a large number of children as a measure of their high status, and men regard it as a sign of their own virility.

Regardless of which alternative is more successful, many oppose birth-control programs for religious and political reasons. Adherents of several religions, including Roman Catholics, fundamentalist Protestants, Muslims, and Hindus, have religious convictions that prevent them from using some or all birth-control devices. Opposition is strong within the United States to terminating pregnancy by abortion, and the U.S. government has at times withheld aid to countries and family-planning organizations that advise abortion, even when such advice is only a small part of the overall aid program.

Analysts agree that the most effective means of reducing births would employ both alternatives. But LDC governments and international family-planning organizations have limited

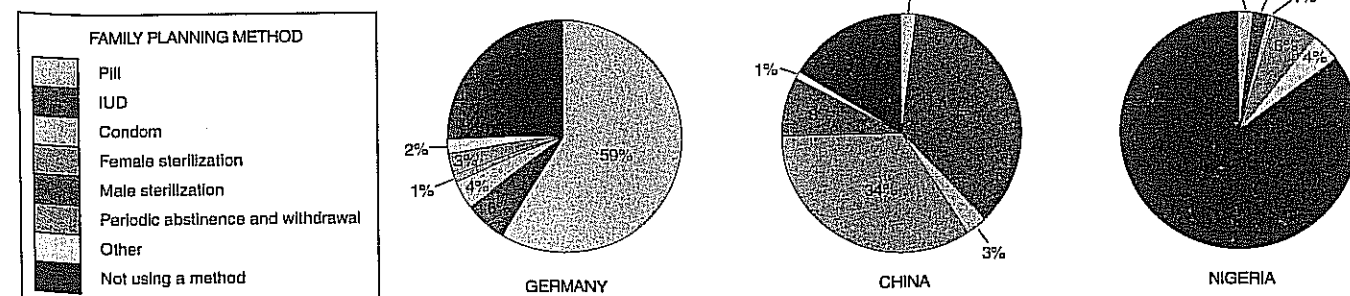
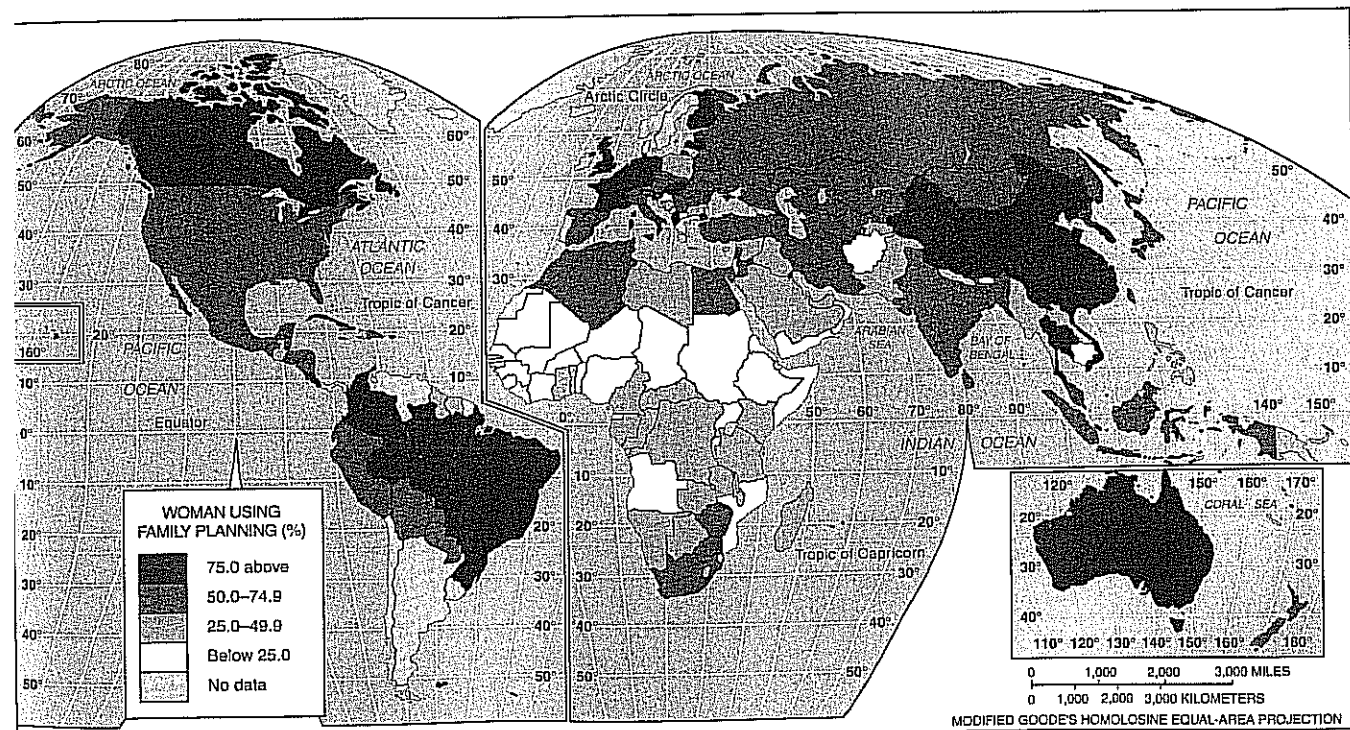


FIGURE 2-22 Family planning. Approximately three-fourths of couples in North America and Western Europe use a family-planning method, primarily condoms or birth control pills. Family-planning practices vary more widely in other regions. China reports the world's highest rate of family planning, primarily with the use of intrauterine devices (IUDs) and female sterilization. The lowest rates are in countries of sub-Saharan Africa, such as Nigeria.

funds to promote lower birth rates, so they must set priorities and make choices for allocating scarce funds.

World Health Threats

Lower CBRs have been responsible for declining NIRs in most countries. However, in some countries of sub-Saharan Africa, lower NIRs have also resulted from higher CDRs, especially through the diffusion of AIDS.

Medical researchers have identified an **epidemiologic transition** that focuses on distinctive causes of death in each stage of the demographic transition. The term *epidemiologic transition* comes from **epidemiology**, which is the branch of medical science concerned with the incidence, distribution, and control of diseases that affect large numbers of people. Epidemiologists rely heavily on geographic concepts such as scale and connection, because measures to control and prevent an epidemic derive from understanding its distinctive distribution and method of diffusion.

Epidemiologic Transition Stages 1 and 2

Stage 1 of the epidemiologic transition, as originally formulated by epidemiologist Abdel Omran in 1971, has been called the stage of pestilence and famine. Infectious and parasitic diseases were principal causes of human deaths, along with accidents and attacks by animals and other humans. Malthus called these causes of deaths “natural checks” on the growth of the human population in stage 1 of the demographic transition.

BLACK PLAGUE. Well documented is the origin and diffusion of history's most violent stage 1 epidemic—the Black Plague, or bubonic plague, which was probably transmitted to humans by fleas from migrating infected rats. The Black Plague originated in present-day Kyrgyzstan and was brought from there by a Tatar army when it attacked an Italian trading post on the Black Sea in present-day Ukraine. Italians fleeing the trading post then carried the infected rats on ships west to the major coastal cities of southeastern Europe in 1347. The plague spread from the coast to inland towns and then to rural areas. The plague reached Western Europe in 1348 and northern Europe in 1349. About 25 million Europeans died between 1347 and 1350, at least one-half of the continent's population. Five other epidemics in the late fourteenth century added to the toll in Europe. In China, 13 million died from the plague in 1380.

The plague wiped out entire villages and families, leaving farms with no workers and estates with no heirs. Churches were left without priests and parishioners, schools without teachers and students. Ships drifted aimlessly at sea after entire crews succumbed to the plague.

CHOLERA. Stage 2 of the epidemiologic transition has been called the stage of receding pandemics. A **pandemic** is disease that occurs over a wide geographic area and affects a very high proportion of the population. Improved sanitation, nutrition, and medicine during the Industrial Revolution reduced the spread of infectious diseases.

Death rates did not decline immediately and universally during the early years of the Industrial Revolution. Poor people

crowded into rapidly growing industrial cities had especially high death rates. Cholera—unknown in rural areas—became an especially virulent epidemic in urban areas during the Industrial Revolution. One-half million people died of cholera in New York City in 1832, and one-eighth of the population of Cairo in 1831.

Geographic methods played a key role in understanding the cause of cholera during the early nineteenth century. The *Report of Sanitary Condition of the Labouring Population of Great Britain*, written in 1842 by Edwin Chadwick (1800–1890) showed that residents of poorer neighborhoods had a much higher incidence of cholera and other diseases and died at a younger age. Dr. John Snow (1813–1858) mapped the distribution of deaths from cholera in 1854 in the poor London neighborhood of Soho (Figure 2–23).

Many in the nineteenth century believed that epidemic victims were being punished for sinful behavior and that most victims were poor because poverty was considered a sin. Dr. Snow, however, showed that cholera was not distributed uniformly among the poor. Predating GIS by more than a century, Dr. Snow overlaid a map of the distribution of cholera victims with a map of the distribution of water pumps—for poor people the source of water for drinking, cleaning, and cooking. Dr. Snow found that a large percentage of cholera victims were clustered around one pump, on Broad Street (refer to Figure 2–23). Tests proved that the water at the Broad Street pump was contaminated, and further investigation revealed that contaminated sewage was getting into the water supply near the pump.

Construction of water and sewer systems eradicated cholera by the late nineteenth century. However, cholera reappeared a century later in rapidly growing cities of LDCs as they moved into stage 2 of the demographic transition.

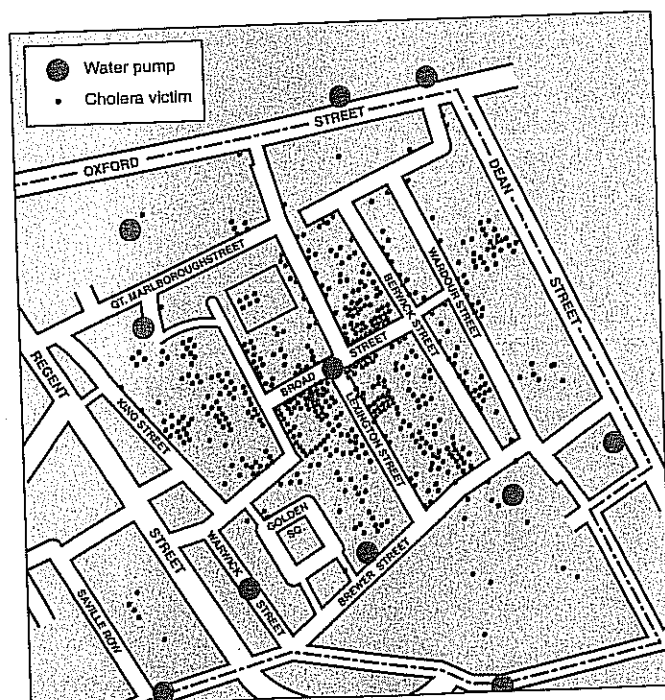


FIGURE 2–23 Cholera in Soho, London, 1854. Dr. John Snow mapped the distribution of cholera victims and water pumps to prove that the cause of the infection was contamination of the pump near the corner of Broad and Lexington streets.

Epidemiologic Transition Stages 3 and 4

Stage 3 of the epidemiologic transition, the stage of degenerative and human-created diseases, is characterized by a decrease in deaths from infectious diseases and an increase in chronic disorders associated with aging. The two especially important chronic disorders in stage 3 are cardiovascular diseases, such as heart attacks, and various forms of cancer.

The decline in infectious diseases has been sharp in stage 3 countries. Cases of polio declined in the United States from 14,000 in 1954 to 167 in 1965, 20 in 1975, and 0 in the entire Western Hemisphere during the 1990s. Worldwide polio cases declined from 39,000 in 1985 to 6,000 in 1994. The number of measles cases per year declined in the United States from 760,000 in 1958 to 2,000 during the 1980s and 1,000 during the 1990s. Fatalities from measles for children under age 15 declined in England from 110 per 100,000 during the nineteenth century to 10 during the 1940s and none during the 1960s. Effective vaccines were responsible for these declines.

As LDCs have moved recently from stage 2 to stage 3, infectious diseases have also declined. The number of cases of polio, neonatal tetanus, diphtheria, and pertussis declined by more than three-fourths in Southeast Asia between 1988 and 1994. The number of cases of leprosy declined from 483,000 in 1990 to 159,000 in 1993 in Africa.

Omran's epidemiologic transition was extended by S. Jay Olshansky and Brian Ault to stage 4, the stage of delayed degenerative diseases. The major degenerative causes of death—cardiovascular diseases and cancers—linger, but the life expectancy of older people is extended through medical advances. Through medicine, cancers spread more slowly or are removed altogether. Operations such as bypasses repair deficiencies in the cardiovascular system.

Also improving health are behavior changes such as better diet, reduced use of tobacco and alcohol, and exercise.

Epidemiologic Transition Possible Stage 5

Some medical analysts argue that the world is moving into stage 5 of the epidemiologic transition, the stage of reemergence of infectious and parasitic diseases. Infectious diseases thought to have been eradicated or controlled have returned, and new ones have emerged. A consequence of stage 5 would be higher CDRs. Other epidemiologists dismiss recent trends as a temporary setback in a long process of controlling infectious diseases.

REASONS FOR STAGE 5. Three reasons help to explain the possible emergence of a stage 5 of the epidemiologic transition. One is evolution. Infectious disease microbes have continuously evolved and changed in response to environmental pressures by developing resistance to drugs and insecticides. Antibiotics and genetic engineering contribute to the emergence of new strains of viruses and bacteria.

Malaria was nearly eradicated in the mid-twentieth century by spraying DDT in areas infested with the mosquito that carried the parasite. For example, new malaria cases in Sri Lanka fell from 1 million in 1955 to 18 in 1963. The disease returned after 1963, however, and now causes more than 1 million deaths worldwide annually. A major reason was the evolution of DDT-resistant mosquitoes.

A second reason for continued epidemics is poverty. Tuberculosis (TB) is an example of an infectious disease that has been largely controlled in relatively developed countries like the United States but remains a major cause of death in LDCs (Figure 2-24).

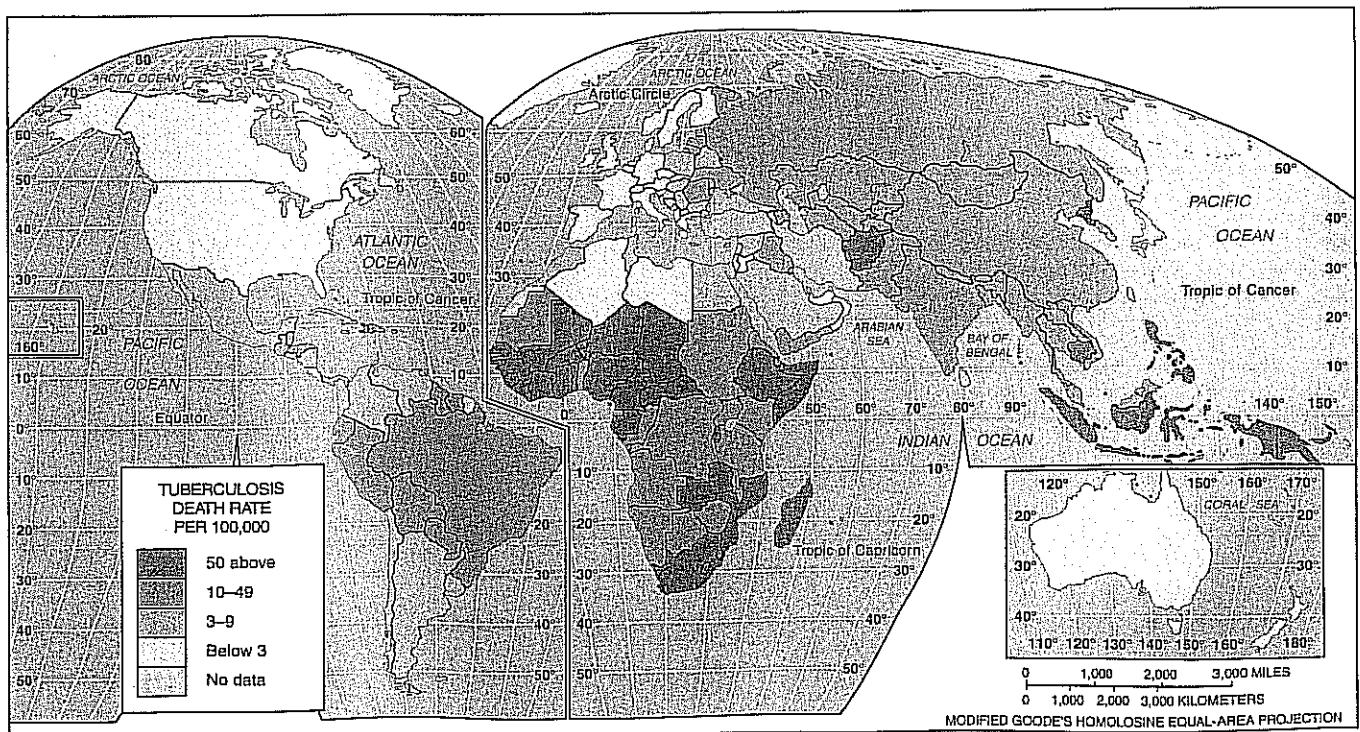


FIGURE 2-24 Tuberculosis (TB) death rate, 2005. Death from tuberculosis is a good indicator of a country's ability to invest in health care, because treating the disease is expensive.